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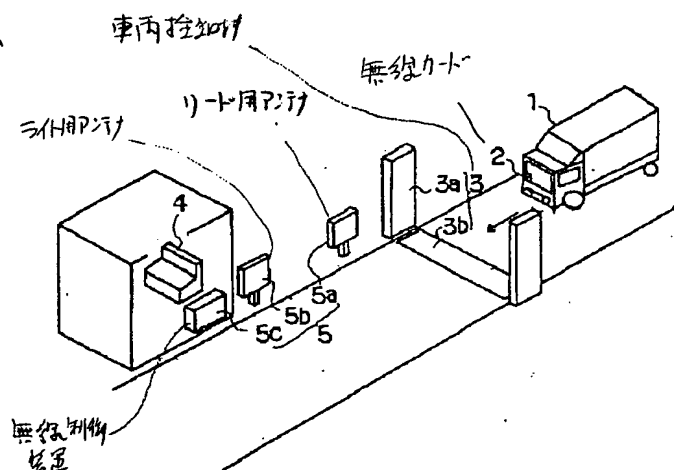
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(54) 【発明の名称】 無線カードを用いた料金収受システム

(57) 【要約】

【目的】 無線カード搭載車両と無線カード非搭載車両とが混在して料金所に流入してくる場合でも、これらを自動的に判別することができ、係員の負担の軽減を図ることができるとともに、通行券の誤発行等を防止して信頼性の向上を図ることのできる無線カードを用いた料金収受システムを提供する。

【構成】 無線カード2のカード読み取りデータは、リード用アンテナ5aを介して無線制御装置5cにより受信され、車両検知装置3に送られる。車両検知装置3では、車両検知データとこのカード読み取りデータとを合成し、車両1についての車両データとして料金処理機4に送る。料金処理機4では、受け取った車両データによって車両1が無線カード2の搭載車であるか否かを認識する。そして、非搭載車である場合は通行券の発行を行い、搭載車の場合はき込みデータを無線制御装置5cに送り、無線制御装置5cからライト用アンテナ5bを介して車両1内の無線カード2に書き込む。



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【特許請求の範囲】

【請求項1】 所定部位に設けられた車両検知センサによって車両を検知する車両検知手段と、

前記車両検知センサ部およびその近傍において、車両に搭載された無線カードからの信号を受信し、該無線カード内に記憶されている所定のデータを読み取る通信手段と、

前記車両検知手段からの車両検知信号と、前記通信手段の読取結果とから、無線カード搭載車と無線カード非搭載車とを判別し、この判別結果に応じて無線カード搭載車に対するデータ書き込み処理および無線カード非搭載車に対する発券処理をそれぞれ実行する料金処理手段とを具備したことを特徴とする無線カードを用いた料金収受システム。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、有料道路の通行料金の収受等に利用される無線カードを用いた料金収受システムに関する。

【0002】

【従来の技術】従来、対距離制の有料道路においては、通行券といわれる磁気媒体を利用している。そして、入口ゲートの料金処理機でこの通行券に入口料金所番号、月日時分等の情報を記録し、出口ゲートの料金処理機で通行券からこれらの情報を読み取ることによって、通行料金の算出、不正通行車両の検出等を行っている。

【0003】また、近年では、このような有料道路等の有料施設の利用料金の収受に、無線媒体いわゆる無線カードを用いたシステムが開発されている。このような無線カードを用いた料金収受システムを対距離制の有料道路に用いた場合、入口ゲートにおいて無線通信により無線カードに入口料金所番号、月日時分等の情報を記録し、出口ゲートにおいて無線通信により無線カードからこれらの情報を読み取ることによって、通行料金の算出等を行うことになる。

【0004】このような無線カードを用いた料金収受システムでは、有料道路の料金所ゲート等における料金収受の作業に要する時間を短縮することができ、その効率化を図ることができる。

【0005】

【発明が解決しようとする課題】しかしながら、上記説明の無線カードを用いた料金収受システムでは、料金所ゲートに無線カード搭載車両と無線カード非搭載車両が混在して流入してくることになり、例えば対距離制の有料道路の入口ゲートにおいては、無線カード非搭載車両に対しては通行券を発行し、無線カード搭載車両に対しては通行券発行を中止して無線カードへの情報の記録が必要となり、これらの管理が複雑になり、係員の負担が増加するとともに、例えば無線カード搭載車両に対して通行券を発行してしまう等、通行券の誤発行等を生じる

可能性があるという問題がある。

【0006】本発明は、かかる従来の事情に対処してなされたもので、無線カード搭載車両と無線カード非搭載車両とが混在して料金所に流入してくる場合でも、これらを自動的に判別することができ、係員の負担の軽減を図ることができるとともに、通行券の誤発行等を防止して信頼性の向上を図ることのできる無線カードを用いた料金収受システムを提供しようとするものである。

【0007】

10 【課題を解決するための手段】すなわち、本発明の無線カードを用いた料金収受システムは、所定部位に設けられた車両検知センサによって車両を検知する車両検知手段と、前記車両検知センサ部およびその近傍において、車両に搭載された無線カードからの信号を受信し、該無線カード内に記憶されている所定のデータを読み取る通信手段と、前記車両検知手段からの車両検知信号と、前記通信手段の読取結果とから、無線カード搭載車と無線カード非搭載車とを判別し、この判別結果に応じて無線カード搭載車に対するデータ書き込み処理および無線カード非搭載車に対する発券処理をそれぞれ実行する料金

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【0008】

【作用】上記構成の本発明の無線カードを用いた料金収受システムでは、料金処理手段が、車両検知手段からの車両検知信号と、車両検知センサ部およびその近傍において車両に搭載された無線カードからの信号を受信する通信手段の読取結果とから、無線カード搭載車と無線カード非搭載車とを判別し、この判別結果に応じて無線カード搭載車に対するデータ書き込み処理および無線カード非搭載車に対する発券処理をそれぞれ実行する。

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【0009】したがって、無線カード搭載車両と無線カード非搭載車両とが混在して料金所に流入してくるような場合でも、これらを自動的に判別することができ、係員の負担の軽減を図ることができるとともに、通行券の誤発行等を防止して信頼性の向上を図ることができる。

【0010】

【実施例】以下、本発明を有料道路の通行料金の収受に適用した一実施例を図面を参照して説明する。

40 【0011】図1は、本発明の一実施例の無線カードを用いた料金収受システムの構成を示すもので、同図において1は車両であり、図示矢印の如く料金所ゲートに進入する。この車両1は、無線通信により情報の読み取りおよび書き込みが可能な無線カード2を搭載している。

【0012】また、同図において3は車両検知装置、4は料金処理機、5は地上局である。車両検知装置3は、通行路を隔てて対向する如く配置された投光器および受光器からなる車両分離器3aと、これらの投光器および受光器の間の路面に埋設され車両による押圧により軸数を計数する踏板3bを備え、車両1が通過したことを検知する。この車両検知装置3からの車両検知情報は、料

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金処理機4に送られ、料金処理機4はこの車両検知情報に基づいて通行券を発行する。通行券には、料金所番号、車種、通過時刻等の情報が書き込まれる。また、料金処理機4は無線カード2搭載車に対しては、後述するようにして通行券の発行を行わず、無線カード2に、料金所番号、車種、日時等の情報を書き込む。

【0013】また、地上局5は、無線カード2との情報の送受信を行うためのものであり、無線カード2の情報を読み取るためのリード用アンテナ5aと、無線カード2に対して情報を書き込むためのライト用アンテナ5bと、無線制御装置5cとから構成されている。この無線制御装置5cは、車両検知装置3に対する無線カード2の読み取り情報の送信、料金処理機4からの書き込みデータの受信、リード用アンテナ5aおよびライト用アンテナ5bの制御等を行う。

【0014】図2は、上記各部のデータの流れを示すブロック図である。この図に示すように、無線カード2の固有情報(有効年月日、システムコード、IDコード等)であるカード読み取りデータ10は、無線カード2からリード用アンテナ5aを介して無線制御装置5cにより受信され、さらに、このカード読み取りデータ10は、車両検知装置3に送られる。

【0015】車両検知装置3では、車両分離器3aおよび踏板3bからの車両検知データとこの無線制御装置5cからのカード読み取りデータ10とを合成し、車両1についての車両データ11として、無線カード2についての情報を含んだ形で料金処理機4に送る。

【0016】料金処理機4では、受け取った車両データ11によって車両1が無線カード2の搭載車であるか否かを認識する。そして、非搭載車である場合は通行券の発行を行う。一方、搭載車の場合は、車両データ11中の無線カード2についての情報を読み込み、有効期限のチェック、IDコードのチェック等を行った後、誤書き込み防止用のIDコード、料金所番号、車種、日時等を含む書き込みデータ12を無線制御装置5cに送り、無線制御装置5cからライト用アンテナ5bを介して車両1内の無線カード2に書き込む。

【0017】図3において斜線を付した領域A、Bは、リード用アンテナ5aと無線カード2の通信可能領域およびライト用アンテナ5bと無線カード2の通信可能領域を概略的に示すものである。リード用アンテナ5aの通信可能領域Aは、車両検知装置3の検知領域と重なるようにその車両進行方向やや前方に設定されており、ライト用アンテナ5bの通信可能領域Bは、通信可能領域Aからさらに車両進行方向前方に設定されている。

【0018】このように、リード用アンテナ5aの通信可能領域Aと車両検知装置3の検知領域とが重なるように設定することにより、車両検知信号と無線カード2からのデータとを同様なタイミングで取り扱うことが可能となり、車両毎に確実に無線カード2の搭載、非搭載を

判別することが可能となる。

【0019】次に、上記構成の本実施例の無線カード2を用いた料金収受システムの動作について、図4のフローチャートを参照しつつ説明する。

【0020】無線カード2を所持した車両1が料金所ゲートに進入してくると、まず、車両1の前部が車両分離器3aおよび踏板3bの検出位置にさしかかった時点で、これらの機構により車両1の進入が検知される(101)。

10 【0021】この後、車両1が進行し、図3に示したライト用アンテナ5bの通信可能領域Aにさしかかると、ライト用アンテナ5bを介して無線制御装置5cによる無線カード2のデータの読み取りが行われる(102)。

【0022】しかる後、踏板3bを後輪が通過し、車両分離器3aによって車両1の後端部が検出されることにより、車両1の通過が検知される(103)。

20 【0023】すると、踏板3bおよび車両分離器3aによるこれらの車両検知結果は、車両検知信号として、無線制御装置5cによる無線カード2のデータの読み取り結果とともに料金処理機4に送られ、料金処理機4は、まず無線カード2の読み取り検知があったか否かを判定する(104)。

【0024】そして、無線カード2の読み取り検知があった場合は、読み取りデータから無線カード2の有効期限のチェック、IDコードのチェック等を行うとともに、係員に対して進入車両1が無線カード2の搭載車である旨および車種設定を促す旨の表示を行い(105)、係員が車種設定を行うと(106)、誤書き込み防止用のIDコード、料金所番号、車種、日時等を含む書き込みデータ12を無線制御装置5cに送り、無線制御装置5cからライト用アンテナ5bを介して車両1内の無線カード2に入口情報の記録を行う(107)。

【0025】一方、無線カード2の読み取り検知がなかった場合は、係員に対して車種設定を促す旨の表示を行い(108)、係員が車種設定を行うと(109)、料金所番号、車種、日時等の入口情報を書き込んだ通行券を発行する(110)。

40 【0026】このように、本実施例の無線カード2を用いた料金収受システムによれば、料金所ゲートに無線カード2の搭載車両と非搭載車両とが混在して流入してくるような場合でも、これらを自動的に判別することができ、係員の負担の軽減を図ることができる。例えば無線カード2の搭載車両に対して通行券を発行してしまう等の通行券の誤発行を防止して信頼性の向上を図ることができる。

【0027】なお、上記実施例では、本発明を有料道路の通行料金の収受に適用した場合について説明したが、本発明はかかる実施例に限定されるものではなく、例えば駐車場の駐車料金の収受等、あらゆる料金の収受に適

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用することができる。

【0028】

【発明の効果】以上説明したように、本発明の無線カードを用いた料金収受システムによれば、無線カード搭載車両と無線カード非搭載車両とが混在して料金所に流入してくる場合でも、これらを自動的に判別することができ、係員の負担の軽減を図ることができるとともに、通行券の誤発行等を防止して信頼性の向上を図ることができる。

【図面の簡単な説明】

【図1】本発明の一実施例の無線カードを用いた料金収受システムの構成を示す図。

【図2】図1の無線カードを用いた料金収受システムの要部構成を示す図。

【図3】図1のリード用アンテナおよびライト用アンテナ

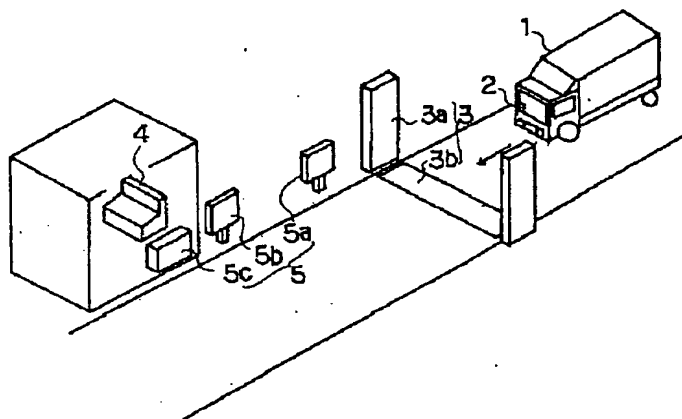
ナの通信可能領域を示す図。

【図4】図1の無線カードを用いた料金収受システムの動作を説明するための図。

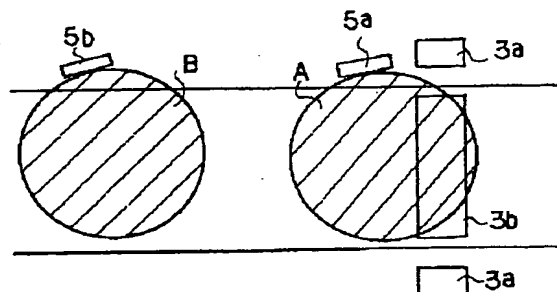
【符号の説明】

- 1 車両
- 2 無線カード
- 3 車両検知装置
- 3a 車両分離器
- 3b 踏板
- 4 料金処理機
- 5 地上局
- 5a リード用アンテナ
- 5b ライト用アンテナ
- 5c 無線制御装置

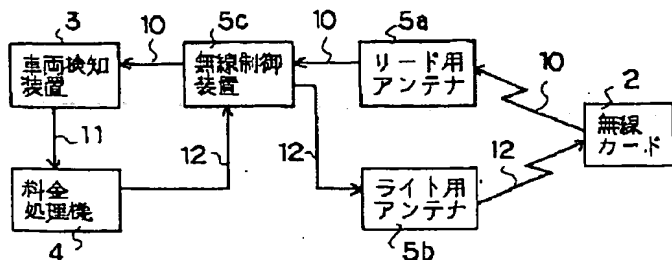
【図1】



【図3】



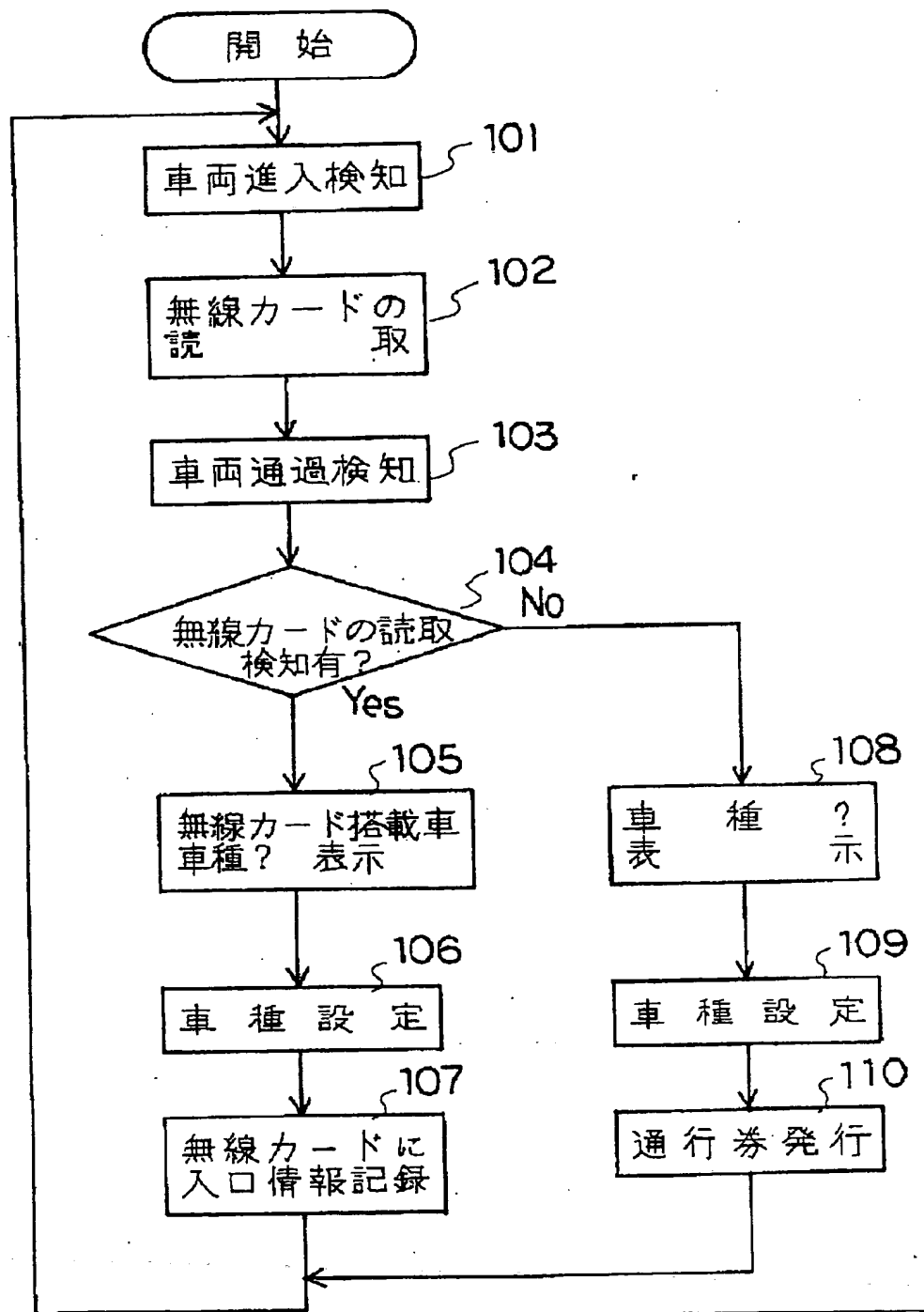
【図2】



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【図4】



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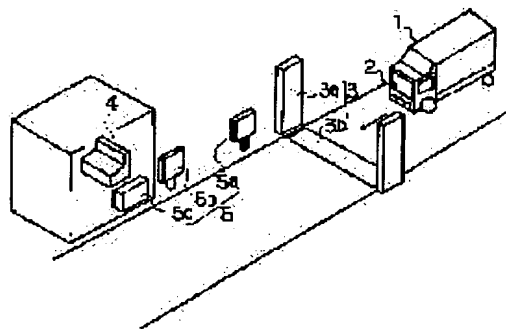
(72)Inventor : HASHIMOTO KAZUYUKI

(54) FARE COLLECTING/RECEIVING SYSTEM USING RADIO CARD

(57)Abstract:

PURPOSE: To provide a fare collecting/receiving system using radio cards which can automatically discriminate a vehicle mounting a radio card even when a vehicle mounting a radio card and a vehicle having no radio card mixedly enter into a fare station, reduce clerk's load, prevent the misissue or the like of a passenger ticket, and improve reliability.

CONSTITUTION: Card reading data read out from a radio card 2 are received by a radio control device 5c through a reading antenna 5a and sent to a vehicle detector 3. The detector 3 combines vehicle detecting data and the card reading data and sends the combined data to a fare processor 4 as the vehicle data of a vehicle 1. The processor 4 recognizes whether the vehicle 1 is a vehicle mounting a radio card 2 or not. When the vehicle 1 is a vehicle having no radio card, the processor 4 issues a passenger ticket, and in the case of a vehicle mounting a radio card, sends writing data to the device 5c, which writes the data in the card 2 mounted on the vehicle 1 through a writing antenna.



LEGAL STATUS

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30.11.1998

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CLAIMS

[Claim(s)]

[Claim 1] In a vehicle detection means to detect a vehicle by the vehicle detection sensor formed in the predetermined site, and the aforementioned vehicle detection sensor section and its near The means of communications which reads the predetermined data which receive the signal from the radio card carried in the vehicle, and are memorized in this radio card, From the vehicle detection signal from the aforementioned vehicle detection means, and the reading result of the aforementioned means of communications A radio card loading vehicle, and radio card a non-carrying vehicle are distinguished. The tariff **** system using the radio card characterized by providing a tariff processing means to perform data write-in processing to a radio card loading vehicle, and issue-of-banknotes processing to radio card a non-carrying vehicle according to this distinction result, respectively.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] this invention relates to the tariff **** system using the radio card used for **** of the toll of a toll road etc.

[0002]

[Description of the Prior Art] Conventionally, the magnetic medium called passing ticket is used in the toll road of the system for distance. And informations, such as an inlet tollgate number and days-and-months time, are recorded on this passing ticket with the tariff processing machine of the inlet gate, and calculation of a toll, the detection of an unjust passing vehicle, etc. are performed by reading these informations in a passing ticket with the tariff processing machine of the outlet gate.

[0003] Moreover, in recent years, the system which used the radio medium ***** radio card for **** of the use tariff of charged facilities, such as such a toll road, is developed. When the tariff **** system using such a radio card is used for the toll road of the system for distance, in the inlet gate, informations, such as an inlet tollgate number and days-and-months time, will be recorded on a radio card by the radio, and calculation of a toll etc. will be performed by reading these informations in a radio card by the radio in the outlet gate.

[0004] In the tariff **** system using such a radio card, the time which work of tariff **** in the tollgate gate of a toll road etc. takes can be shortened, and the increase in efficiency can be attained.

[0005]

[Problem(s) to be Solved by the Invention] however, in the tariff **** system using the radio card of the above-mentioned explanation A radio card loading vehicle, and radio card a non-carrying vehicle will be intermingled to the tollgate gate, and will flow into it, for example, it sets to the inlet gate of the toll road of the system for distance. While publish a passing ticket to radio card a non-carrying vehicle, and stop passing ticket issue to a radio card loading vehicle, record of the information on a radio card is needed, these managements become complicated and an official's in charge burden increases For example, there is a problem that the incorrect issue of a grade and a passing ticket which publishes a passing ticket to a radio card loading vehicle may be produced.

[0006] Even when this invention copes with such a conventional situation, and was made, a radio card loading vehicle, and radio card a non-carrying vehicle are intermingled and it flows into a tollgate, while these can be distinguished automatically and mitigation of an official's in charge burden can be aimed at, it is going to offer the tariff **** system using the radio card which can prevent incorrect issue of a passing ticket etc. and can aim at enhancement in a reliability.

[0007]

[Means for Solving the Problem] Namely, the tariff **** system using the radio card of this invention In a vehicle detection means to detect a vehicle by the vehicle detection sensor formed in the predetermined site, and the aforementioned vehicle detection sensor section and its near The means of communications which reads the predetermined data which receive the signal from the radio card carried in the vehicle, and are memorized in this radio card, From the vehicle detection signal from the aforementioned vehicle detection means, and the reading result of the aforementioned means of communications A radio card loading vehicle, and radio card a non-carrying vehicle are distinguished, and it is characterized by providing a tariff processing means to perform data write-in processing to a radio card loading vehicle, and issue-of-banknotes processing to radio card a non-carrying vehicle according to this distinction result, respectively.

[0008]

[Function] In the tariff **** system using the radio card of this invention of the above-mentioned configuration A tariff processing means from the reading result of the means of communications which receives the vehicle detection signal from a vehicle detection means, and

the signal from the radio card carried in the vehicle in the vehicle detection sensor section and its near A radio card loading vehicle, and radio card a non-carrying vehicle are distinguished, and data write-in processing to a radio card loading vehicle and issue-of-banknotes processing to radio card a non-carrying vehicle are performed according to this distinction result, respectively.

[0009] Therefore, even when a radio card loading vehicle, and radio card a non-carrying vehicle are intermingled and it flows into a tollgate, while these can be distinguished automatically and mitigation of an official's in charge burden can be aimed at, incorrect issue of a passing ticket etc. can be prevented and enhancement in a reliability can be aimed at.

[0010]

[Example] Hereafter, one example which applied this invention to **** of the toll of a toll road is explained with reference to a drawing.

[0011] Drawing 1 shows the tariff **** structure of a system which used the radio card of one example of this invention, and in this drawing, 1 is a vehicle and advances into the tollgate gate like the illustration arrow head. This vehicle 1 carries the radio card 2 in which informational reading and informational writing are possible by the radio.

[0012] Moreover, as for vehicle detection equipment and 4, in this drawing, 3 is [a tariff processing machine and 5] earth stations. It detects that the vehicle detection equipment 3 was equipped with step board 3b which is laid under the road surface between vehicle eliminator 3a which consists of the projector and electric eye which have been arranged so that a passing way may be separated and it may counter, and these projectors and an electric eye, and carries out counting of the number of shafts by the press by the vehicle, and the vehicle 1 passed it. The vehicle detection information from this vehicle detection equipment 3 is sent to the tariff processing machine 4, and the tariff processing machine 4 publishes a passing ticket based on this vehicle detection information. Informations, such as a tollgate number, a type of a car, and transit time, are written in a passing ticket. Moreover, to a radio card 2 loading vehicle, as the tariff processing machine 4 is mentioned later, it does not publish a passing ticket, and it writes informations, such as a tollgate number, a type of a car, and time, in the radio card 2.

[0013] Moreover, an earth station 5 is for transmitting and receiving the information on the radio card 2, and consists of the antenna 5a for a lead for reading the information on the radio card 2, the antenna 5b for lights for writing in an information to the radio card 2, and radio control equipment 5c. This radio control equipment 5c performs a control of sending of the reading information on the radio card 2 to the vehicle detection equipment 3, a reception of the write-in data from the tariff processing machine 4, antenna 5a for a lead, and antenna 5b for lights etc.

[0014] Drawing 2 is a block diagram showing the data flow of each part of the above. As shown in this drawing, the card reading data 10 which are the peculiar informations on the radio card 2 (an effective date, a system code, ID cord, etc.) are received by radio control equipment 5c through antenna 5a for a lead from the radio card 2, and this card reading data 10 is further sent to the vehicle detection equipment 3.

[0015] In the vehicle detection equipment 3, the vehicle detection data from vehicle eliminator 3a and step board 3b and the card reading data 10 from this radio control equipment 5c are compounded, and it sends to the tariff processing machine 4 in the type which included the information about the radio card 2 as vehicle data 11 about a vehicle 1.

[0016] In the tariff processing machine 4, it recognizes whether a vehicle 1 is the loading vehicle of the radio card 2 with the received vehicle data 11. And a passing ticket is published when it is a non-carrying vehicle. On the other hand, after reading the information about the radio card 2 in the vehicle data 11 and performing the check of the term of validity, the check of an ID cord, etc., in the case of a loading vehicle, the write-in data 12 containing the ID cord for incorrect write-in prevention, a tollgate number, a type of a car, time, etc. are sent to radio control equipment 5c, and it writes them in the radio card 2 in a vehicle 1 through antenna 5b for lights from radio control equipment 5c.

[0017] The fields A and B which attached the oblique line in drawing 3 show roughly the field of antenna 5a for a lead, and the radio card 2 which can be communicated, and the field of antenna 5b for lights, and the radio card 2 which can be communicated. Field A of antenna 5a for a lead

which can be communicated is set up a little ahead [the / method ** / of vehicle advance] so that it may lap with the detection field of the vehicle detection equipment 3, and field B of antenna 5b for lights which can be communicated is further set up ahead / vehicle advance orientation / from field A which can be communicated.

[0018] Thus, by setting up so that field A of antenna 5a for a lead which can be communicated, and the detection field of the vehicle detection equipment 3 may lap, it is enabled to deal with a vehicle detection signal and the data from the radio card 2 to the same timing, and is enabled to distinguish loading of the radio card 2 and un-carrying certainly for every vehicle.

[0019] Next, an operation of the tariff **** system using the radio card 2 of this example of the above-mentioned configuration is explained, referring to the flow chart of drawing 4 .

[0020] If the vehicle 1 which possessed the radio card 2 advances into the tollgate gate, when the pars anterior of a vehicle 1 puts in the detection position of vehicle eliminator 3a and step board 3b, an entry of a vehicle 1 will be first detected by these devices (101).

[0021] Then, a vehicle 1 runs, and if it puts in field A of antenna 5b for lights shown in drawing 3 which can be communicated, reading of the data of the radio card 2 by radio control equipment 5c will be performed through antenna 5b for lights (102).

[0022] After an appropriate time, a rear wheel passes step board 3b, and when the back end section of a vehicle 1 is detected by vehicle eliminator 3a, transit of a vehicle 1 is detected (103).

[0023] Then, these vehicle detection results by step board 3b and vehicle eliminator 3a are sent to the tariff processing machine 4 as a vehicle detection signal with the reading result of the data of the radio card 2 by radio control equipment 5c, and it judges whether the tariff processing machine 4 had reading detection of the radio card 2 first (104).

[0024] And when there is reading detection of the radio card 2 While the check of the term of validity of the radio card 2, the check of an ID cord, etc. are performed from reading data The purport to which the purport and type-of-a-car setup whose entry vehicle 1 is the loading vehicle of the radio card 2 are urged to an official in charge is displayed (105). When an official in charge performs a type-of-a-car setup (106), the ID cord for incorrect write-in prevention, The write-in data 12 containing a tollgate number, a type of a car, time, etc. are sent to radio control equipment 5c, and an inlet information is recorded on the radio card 2 in a vehicle 1 through antenna 5b for lights from radio control equipment 5c (107).

[0025] On the other hand, if the purport to which a type-of-a-car setup is urged to an official in charge is displayed (108) and an official in charge performs a type-of-a-car setup when there is no reading detection of the radio card 2 (109), the passing ticket which wrote in inlet informations, such as a tollgate number, a type of a car, and time, will be published (110).

[0026] Thus, according to the tariff **** system using the radio card 2 of this example Even when the loading vehicle and the non-carrying vehicle of the radio card 2 intermingle and flow into the tollgate gate, while these can be distinguished automatically and mitigation of an official's in charge burden can be aimed at For example, incorrect issue of the passing ticket of the grade which publishes a passing ticket to the loading vehicle of the radio card 2 can be prevented, and enhancement in a reliability can be aimed at.

[0027] In addition, although the above-mentioned example explained the case where this invention was applied to **** of the toll of a toll road, this invention is not limited to such an example and can apply **** of the parking tariff of a parking lot etc. to **** of all tariffs.

[0028]

[Effect of the Invention] As explained above, even when according to the tariff **** system using the radio card of this invention a radio card loading vehicle, and radio card a non-carrying vehicle are intermingled and it flows into a tollgate, while these can be distinguished automatically and mitigation of an official's in charge burden can be aimed at, incorrect issue of a passing ticket etc. can be prevented and enhancement in a reliability can be aimed at.

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Field

[Field of the Invention] this invention relates to the tariff **** system using the radio card used
for **** of the toll of a toll road etc.

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Technique

[Description of the Prior Art] Conventionally, the magnetic medium called passing ticket is used in the toll road of the system for distance. And informations, such as an inlet tollgate number and days-and-months time, are recorded on this passing ticket with the tariff processing machine of the inlet gate, and calculation of a toll, the detection of an unjust passing vehicle, etc. are performed by reading these informations in a passing ticket with the tariff processing machine of the outlet gate.

[0003] Moreover, in recent years, the system which used the radio medium ***** radio card for **** of the use tariff of charged facilities, such as such a toll road, is developed. When the tariff **** system using such a radio card is used for the toll road of the system for distance, in the inlet gate, informations, such as an inlet tollgate number and days-and-months time, will be recorded on a radio card by the radio, and calculation of a toll etc. will be performed by reading these informations in a radio card by the radio in the outlet gate.

[0004] In the tariff **** system using such a radio card, the time which work of tariff **** in the tollgate gate of a toll road etc. takes can be shortened, and the increase in efficiency can be attained.

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Effect

[Effect of the Invention] As explained above, even when according to the tariff **** system using the radio card of this invention a radio card loading vehicle, and radio card a non-carrying vehicle are intermingled and it flows into a tollgate, while these can be distinguished automatically and mitigation of an official's in charge burden can be aimed at, incorrect issue of a passing ticket etc. can be prevented and enhancement in a reliability can be aimed at.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] however, in the tariff **** system using the radio card of the above-mentioned explanation A radio card loading vehicle, and radio card a non-carrying vehicle will be intermingled to the tollgate gate, and will flow into it, for example, it sets to the inlet gate of the toll road of the system for distance. While publish a passing ticket to radio card a non-carrying vehicle, and stop passing ticket issue to a radio card loading vehicle, record of the information on a radio card is needed, these managements become complicated and an official's in charge burden increases For example, there is a problem that the incorrect issue of a grade and a passing ticket which publishes a passing ticket to a radio card loading vehicle may be produced.

[0006] Even when this invention copes with such a conventional situation, and was made, a radio card loading vehicle, and radio card a non-carrying vehicle are intermingled and it flows into a tollgate, while these can be distinguished automatically and mitigation of an official's in charge burden can be aimed at, it is going to offer the tariff **** system using the radio card which can prevent incorrect issue of a passing ticket etc. and can aim at enhancement in a reliability.

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MEANS

[Means for Solving the Problem] Namely, the tariff **** system using the radio card of this invention In a vehicle detection means to detect a vehicle by the vehicle detection sensor formed in the predetermined site, and the aforementioned vehicle detection sensor section and its near The means of communications which reads the predetermined data which receive the signal from the radio card carried in the vehicle, and are memorized in this radio card, From the vehicle detection signal from the aforementioned vehicle detection means, and the reading result of the aforementioned means of communications A radio card loading vehicle, and radio card a non-carrying vehicle are distinguished, and it is characterized by providing a tariff processing means to perform data write-in processing to a radio card loading vehicle, and issue-of-banknotes processing to radio card a non-carrying vehicle according to this distinction result, respectively.

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OPERATION

[Function] In the tariff **** system using the radio card of this invention of the above-mentioned configuration A tariff processing means from the reading result of the means of communications which receives the vehicle detection signal from a vehicle detection means, and the signal from the radio card carried in the vehicle in the vehicle detection sensor section and its near A radio card loading vehicle, and radio card a non-carrying vehicle are distinguished, and data write-in processing to a radio card loading vehicle and issue-of-banknotes processing to radio card a non-carrying vehicle are performed according to this distinction result, respectively.

[0009] Therefore, even when a radio card loading vehicle, and radio card a non-carrying vehicle are intermingled and it flows into a tollgate, while these can be distinguished automatically and mitigation of an official's in charge burden can be aimed at, incorrect issue of a passing ticket etc. can be prevented and enhancement in a reliability can be aimed at.

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EXAMPLE

[Example] Hereafter, one example which applied this invention to **** of the toll of a toll road is explained with reference to a drawing.

[0011] Drawing 1 shows the tariff **** structure of a system which used the radio card of one example of this invention, and in this drawing, 1 is a vehicle and advances into the tollgate gate like the illustration arrow head. This vehicle 1 carries the radio card 2 in which informational reading and informational writing are possible by the radio.

[0012] Moreover, as for vehicle detection equipment and 4, in this drawing, 3 is [a tariff processing machine and 5] earth stations. It detects that the vehicle detection equipment 3 was equipped with step board 3b which is laid under the road surface between vehicle eliminator 3a which consists of the projector and electric eye which have been arranged so that a passing way may be separated and it may counter, and these projectors and an electric eye, and carries out counting of the number of shafts by the press by the vehicle, and the vehicle 1 passed it. The vehicle detection information from this vehicle detection equipment 3 is sent to the tariff processing machine 4, and the tariff processing machine 4 publishes a passing ticket based on this vehicle detection information. Informations, such as a tollgate number, a type of a car, and transit time, are written in a passing ticket. Moreover, to a radio card 2 loading vehicle, as the tariff processing machine 4 is mentioned later, it does not publish a passing ticket, and it writes informations, such as a tollgate number, a type of a car, and time, in the radio card 2.

[0013] Moreover, an earth station 5 is for transmitting and receiving the information on the radio card 2, and consists of the antenna 5a for a lead for reading the information on the radio card 2, the antenna 5b for lights for writing in an information to the radio card 2, and radio control equipment 5c. This radio control equipment 5c performs a control of sending of the reading information on the radio card 2 to the vehicle detection equipment 3, a reception of the write-in data from the tariff processing machine 4, antenna 5a for a lead, and antenna 5b for lights etc.

[0014] Drawing 2 is a block diagram showing the data flow of each part of the above. As shown in this drawing, the card reading data 10 which are the peculiar informations on the radio card 2 (an effective date, a system code, ID cord, etc.) are received by radio control equipment 5c through antenna 5a for a lead from the radio card 2, and this card reading data 10 is further sent to the vehicle detection equipment 3.

[0015] In the vehicle detection equipment 3, the vehicle detection data from vehicle eliminator 3a and step board 3b and the card reading data 10 from this radio control equipment 5c are compounded, and it sends to the tariff processing machine 4 in the type which included the information about the radio card 2 as vehicle data 11 about a vehicle 1.

[0016] In the tariff processing machine 4, it recognizes whether a vehicle 1 is the loading vehicle of the radio card 2 with the received vehicle data 11. And a passing ticket is published when it is a non-carrying vehicle. On the other hand, after reading the information about the radio card 2 in the vehicle data 11 and performing the check of the term of validity, the check of an ID cord, etc., in the case of a loading vehicle, the write-in data 12 containing the ID cord for incorrect write-in prevention, a tollgate number, a type of a car, time, etc. are sent to radio control equipment 5c, and it writes them in the radio card 2 in a vehicle 1 through antenna 5b for lights from radio control equipment 5c.

[0017] The fields A and B which attached the oblique line in drawing 3 show roughly the field of antenna 5a for a lead, and the radio card 2 which can be communicated, and the field of antenna 5b for lights, and the radio card 2 which can be communicated. Field A of antenna 5a for a lead which can be communicated is set up a little ahead [the / method ** / of vehicle advance] so that it may lap with the detection field of the vehicle detection equipment 3, and field B of antenna 5b for lights which can be communicated is further set up ahead / vehicle advance orientation / from field A which can be communicated.

[0018] Thus, by setting up so that field A of antenna 5a for a lead which can be communicated, and the detection field of the vehicle detection equipment 3 may lap, it is enabled to deal with a vehicle detection signal and the data from the radio card 2 to the same timing, and is enabled to distinguish loading of the radio card 2 and un-carrying certainly for every vehicle.

[0019] Next, an operation of the tariff **** system using the radio card 2 of this example of the above-mentioned configuration is explained, referring to the flow chart of drawing 4 .

[0020] If the vehicle 1 which possessed the radio card 2 advances into the tollgate gate, when the pars anterior of a vehicle 1 puts in the detection position of vehicle eliminator 3a and step board 3b, an entry of a vehicle 1 will be first detected by these devices (101).

[0021] Then, a vehicle 1 runs, and if it puts in field A of antenna 5b for lights shown in drawing 3 which can be communicated, reading of the data of the radio card 2 by radio control equipment 5c will be performed through antenna 5b for lights (102).

[0022] After an appropriate time, a rear wheel passes step board 3b, and when the back end section of a vehicle 1 is detected by vehicle eliminator 3a, transit of a vehicle 1 is detected (103).

[0023] Then, these vehicle detection results by step board 3b and vehicle eliminator 3a are sent to the tariff processing machine 4 as a vehicle detection signal with the reading result of the data of the radio card 2 by radio control equipment 5c, and it judges whether the tariff processing machine 4 had reading detection of the radio card 2 first (104).

[0024] And when there is reading detection of the radio card 2 While the check of the term of validity of the radio card 2, the check of an ID cord, etc. are performed from reading data The purport to which the purport and type-of-a-car setup whose entry vehicle 1 is the loading vehicle of the radio card 2 are urged to an official in charge is displayed (105). When an official in charge performs a type-of-a-car setup (106), the ID cord for incorrect write-in prevention, The write-in data 12 containing a tollgate number, a type of a car, time, etc. are sent to radio control equipment 5c, and an inlet information is recorded on the radio card 2 in a vehicle 1 through antenna 5b for lights from radio control equipment 5c (107).

[0025] On the other hand, if the purport to which a type-of-a-car setup is urged to an official in charge is displayed (108) and an official in charge performs a type-of-a-car setup when there is no reading detection of the radio card 2 (109), the passing ticket which wrote in inlet informations, such as a tollgate number, a type of a car, and time, will be published (110).

[0026] Thus, according to the tariff **** system using the radio card 2 of this example Even when the loading vehicle and the non-carrying vehicle of the radio card 2 intermingle and flow into the tollgate gate, while these can be distinguished automatically and mitigation of an official's in charge burden can be aimed at For example, incorrect issue of the passing ticket of the grade which publishes a passing ticket to the loading vehicle of the radio card 2 can be prevented, and enhancement in a reliability can be aimed at.

[0027] In addition, although the above-mentioned example explained the case where this invention was applied to **** of the toll of a toll road, this invention is not limited to such an example and can apply **** of the parking tariff of a parking lot etc. to **** of all tariffs.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing showing the tariff **** structure of a system using the radio card of one example of this invention.

[Drawing 2] Drawing showing the important section configuration of the tariff **** system using the radio card of drawing 1 .

[Drawing 3] Drawing showing the field of the antenna for a lead of drawing 1 , and the antenna for lights which can be communicated.

[Drawing 4] Drawing for explaining an operation of the tariff **** system using the radio card of drawing 1 .

[Description of Notations]

1 Vehicle

2 Radio Card

3 Vehicle Detection Equipment

3a Vehicle eliminator

3b Step board

4 Tariff Processing Machine

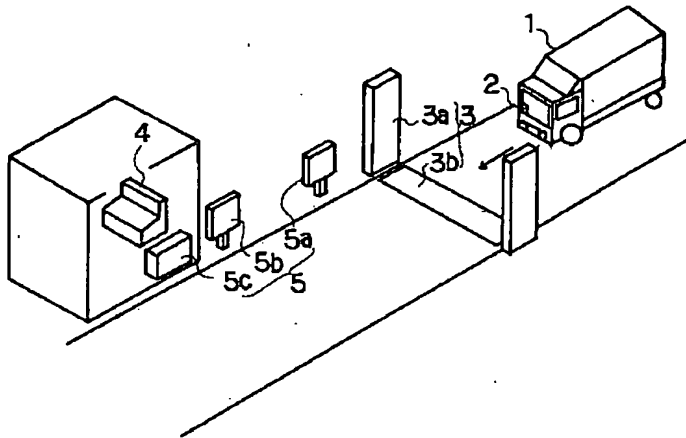
5 Earth Station

5a The antenna for a lead

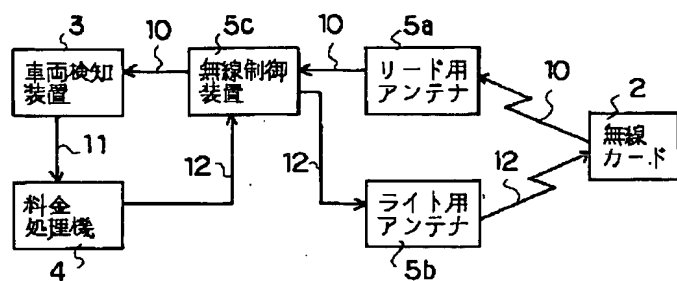

5b The antenna for lights

5c Radio control equipment

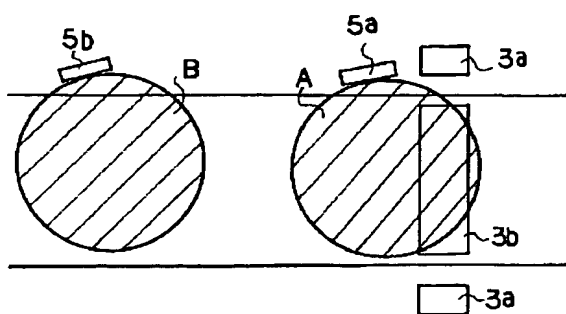
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Drawing selection 

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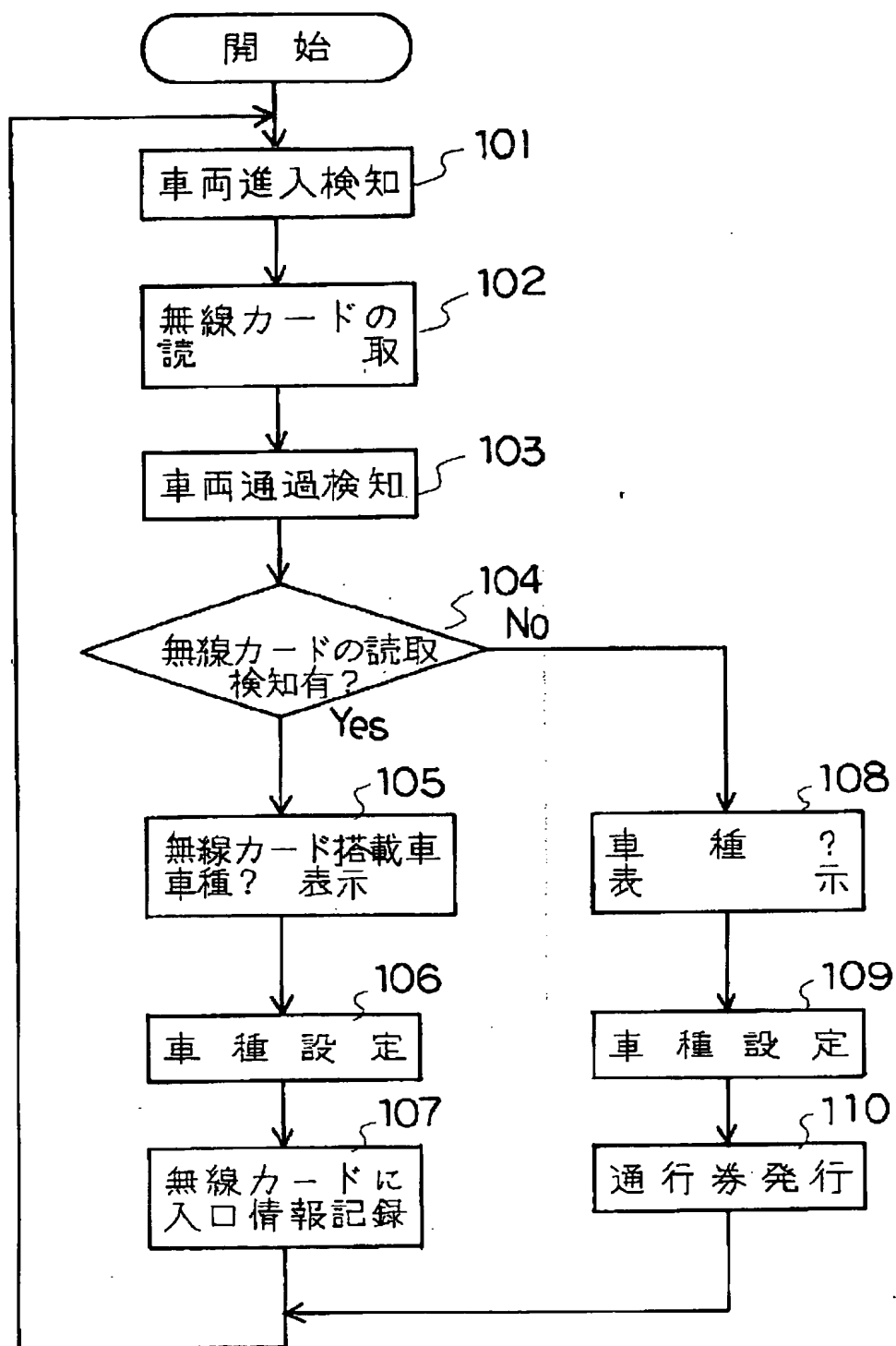
Drawing selection 

[Translation done.]

Drawing selection ☒

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Drawing selection Drawing 4



[Translation done.]